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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

NGUYEN, JUDY

ART UNIT

PAPER NUMBER

2861

DATE MAILED: 07/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/004,816

Applicant(s)

MURAI, MASAMI

Examiner

Judy Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The amendment filed 4/21/03 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the thickness of the adhesive layer 41 is equal to the combined thickness of the adhesive metal layer applied prior to the heat treatment, the anti-diffusion metal, **and the metal that constitutes the bottom electrode** (see page 9 of the amendment). It is noted that the original specification discloses only the combined of two metal layers, not three. Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly

connected, to make and/or use the invention. The specification discloses that the main component of the adhesive layer 41 is an alloy of the anti-diffusion metal and the metal that constitutes the bottom of electrode (page 44; last paragraph). The specification also discloses that the thickness of the adhesive 41 is equal to the combined thickness of the adhesive metal layer and the anti-diffusion metal layer (page 45; last portion of the first paragraph). The latter disclosure does not include the thickness of the metal layer that constitutes the bottom electrode that supposed to be part of the adhesive layer 41 as previously disclosed. Hence, it is unclear how one skilled in the art can make an adhesive layer having a thickness less than the thickness of the combined layers that formed the adhesive layer. Therefore, it is unclear how one of the metal of the adhesive alloy constitutes the bottom electrode as recited in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 28, 31, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (JP 09-260516) in view of Kameyama et al (US 6,208,400).

Sato et al discloses the following elements of the claimed invention:

- A ferroelectric thin film (5) sandwiched between a top electrode (7) and a bottom electrode (4) consists of platinum
- An adhesive layer (3) having an anti-diffusion metal (Ta) formed between the bottom electrode (4) and a surface (2) where the transducer is installed
- An anti-diffusion layer (8) having an anti-diffusion metal (Ti) and formed between the bottom electrode and the ferroelectric thin film (5)

However, Sato et al does not disclose the followings:

- The adhesive layer (Ta metal 3) and the anti-diffusion layer (Ti metal 8) are formed from an alloy, wherein the alloy of the anti-diffusion layer containing the anti-diffusion metal and an adhesive metal (note: the alloy includes metals such as Ti, Cr, Mo W, Al, Ta, Ni. Since these metals have anti-diffusion and adhesion properties and an alloy requires at least two metals, one can be read as anti-diffusion metal while the other is adhesive metal)
- The anti-diffusion metal of the anti-diffusion layer (8) is same as the anti-diffusion metal in the adhesive layer (3).

Nevertheless, Kameyama et al discloses the followings:

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- An adhesive layer/anti-diffusion layer can be either a single metal selected from a list of anti-diffusion metals or an alloy of those metals (column 7; line 11+) including titanium or chromium, wherein an alloy having at least one anti-diffusion metal and one adhesive metal
- Anti-diffusion metals (Ta) and (Ti) are alternatives with each other (column 7; line 11+).

Because using an alloy was art-recognized equivalent to a single metal for acting as an adhesive/anti-diffusion layer at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute the single metal with an equivalent alloy for the purpose of providing a bonding for electrode that prevents diffusion.

In addition, since (Ta) and (Ti) are known to be equivalent alternatives as anti-diffusion metals, using the anti-diffusion metals with the same type or different, but equivalent type would provide the same or equivalent result. Hence, one of ordinary skill in the art would have found it obvious to use either combination including the combination where the metals are of the same type as recited in the claims for the purpose of the providing a strong bonding between an electrode and its attached surfaces.

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6. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al and Kameyama et al as applied to claims 28, 31, 32 above, and further in view of Ishibashi et al (US 6,414,975).

Sato et al as modified suggests all features of the claimed invention except for the anti-diffusion metal being selected from the group consisting of iridium, **palladium**, rhodium, ruthenium, and osmium and the adhesive layer is an alloy of the anti-diffusion metal and the metal constitutes the bottom electrode.

However, Ishibashi et al discloses that Tantalum (Ta), titanium (Ti), palladium (Pd), and platinum (Pt) are equivalent alternatives with each other as an anti-diffusion metal (column 19; second paragraph).

Because (Pd), (Pt), (Ta) and (Ti) were art-recognized equivalent to each other as an anti-diffusion metal at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute the anti-diffusion metal (Ta) and (Ti) with (Pd) or one metal from the alloy of the modified layer above with the metal constitutes the bottom electrode such as platinum (Pt) for the purpose of providing a bonding for electrode that prevents diffusion.

7. Claims 33, 34/28, 34/31, 34/32, 34/33, 35/34/28, 35/34/31, 35/34/32, 35/34/33, 36/34/28, 36/34/31, 36/34/32, 36/34/33 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Sato et al and Kameyama et al as applied to claims 28, 31, 32 above, and further in view of Shimada et al (US 5,802,686).

Sato et al as modified suggests all features of the claimed invention except for the thickness of the ferroelectric thin film being at least 1 micrometer, a diaphragm film formed on at least one side of a pressure chamber, the diaphragm film is constituted by lamination of a silicon oxide film and a zirconium oxide film.

However, Shimada et al discloses a ferroelectric thin film being at least 1 micrometer (column 10; line 35), a diaphragm film (103+201) formed on at least one side of a pressure chamber (102), the diaphragm film is constituted by lamination of a silicon oxide film and a zirconium oxide film (column 16, lines 36+).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Sato as modified to have the thin film thickness and to use the device in the environment having the diaphragm composition as by taught by Shimada et al for the purpose of obtaining an ink discharge printing device having reliable bonding layers that are not peel-off.

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8. Claims 34/29, 35/34/29, 36/34/29, 34/30, 35/34/30, 36/34/30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al, Kameyama et al, and Ishibashi et al as applied to claims 29 and 30 above, and further in view of Shimada et al.

Sato et al as modified suggests all features of the claimed invention except for the thickness of the ferroelectric thin film being at least 1 micrometer, a diaphragm film formed on at least one side of a pressure chamber, the diaphragm film is constituted by lamination of a silicon oxide film and a zirconium oxide film.

However, Shimada et al discloses a ferroelectric thin film being at least 1 micrometer (column 10; line 35), a diaphragm film (103+201) formed on at least one side of a pressure chamber (102), the diaphragm film is constituted by lamination of a silicon oxide film and a zirconium oxide film (column 16, lines 36+).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Sato as modified to have the thin film thickness and to use the device in the environment having the diaphragm composition as by taught by Shimada et al for the purpose of obtaining an ink discharge printing device having reliable bonding layers that are not peel-off.

Response to Arguments

9. Applicant's arguments have been fully considered but they are not persuasive.

Applicant argues that none of the reference discloses an anti-diffusion layer formed of an alloy of the anti-diffusion metal and an adhesive metal. However, the examiner noted that Kameyama et al discloses an alloy having good adhesive properties (column 7; lines 10+). The alloy includes metals such as Ti, Cr, Mo W, Al, Ta, Ni. Since these metals have anti-diffusion and adhesion properties and an alloy requires at least two metals, one can be read as anti-diffusion metal while the other is adhesive metal. Hence Kameyama et al teaches the features as claimed.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will

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the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Judy Nguyen whose telephone number is (703) 305-7062. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ben Fuller can be reached on (703) 308-0750. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3431 for regular communications and (703) 305-3431 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Judy Nguyen
Primary examiner
June 28, 2003